DEPARTMENT OF BIOLOGY

SAFETY PLAN

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Abbreviations Used

AO	Administrative Officer
BSP	Biosafety Program
DCM	Division of Comparative Medicine
DEA	Drug Enforcement Agency
EPP	Emergency Preparedness Plan
EHS	Environmental Health and Safety Office
EMP	Environmental Management Program
IHP	Industrial Hygiene Program
MSDS	Material Safety Data Sheet
OLS	Office of Laboratory Supplies
OSHA	Occupational Safety and Health Act
PCB	Poly Chlorinated Biphenyl
PI	Principal Investigator
RPP	Radiation Protection Office
SP	Safety Program
UROP	Undergraduate Research Opportunities Program

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INTRODUCTION

The following is the Safety Plan for the Department of Biology. Its function is to provide a guide to safe laboratory and related practices. This plan is intended for all students, faculty, staff and others who work in the Department of Biology, Building 68 at MIT.

This plan is reviewed yearly and by means of a monthly meeting of the EHS Rep Committee. Policies and practices outlined in this plan are discussed in detail to insure accurate compliance.

Safety procedures are further outlined through the Department of Biology's Chemical Hygiene Plan. Both the Safety Plan and the Chemical Hygiene Plan are intended to be used as laboratory guidelines to promote safety.

DEPARTMENT OF BIOLOGY
SAFETY PROGRAM

A. ORGANIZATION

1. The ultimate responsibility for laboratory safety rests with the Department Head. Once a year, the Department Head will remind the faculty and laboratory directors of their responsibilities concerning laboratory safety and practices.

2. The Department Safety Committee will consist of a Faculty Advisor, a Committee Chairperson, one representative from each research group and teaching laboratories, at least one representative from the MIT Environmental Health and Safety Office, the Operations Administrator, Safety Officer/EHS Coordinator and Chemical Hygiene Officer for the Department of Biology.

3. Each faculty member has final responsibility for safety in his/her laboratory. S/he may appoint a member of the group as the person responsible for ensuring that the proper safety practices are in effect in the group and to educate other members of the laboratory and safety in the laboratory. This person will also serve as the group's representative on the Department EHS Committee. If the faculty member or laboratory director does not designate such a representative, (s)he will serve as the representative.

4. Training will be conducted through a monthly "EHS committee meeting." Training will include all contents of this Safety Plan and will also include training for the Dept. of Biology Chemical Hygiene Plan. Any change in policy regarding safety issues will be discussed at these meetings.

   For a complete copy of the department of Biology's Safety Plan ask your lab EHS rep or Biology Headquarters, room 68-132.

B. RESPONSIBILITIES AND ACTIVITIES

1. Ensure that all work is conducted in accordance with the Department of Biology chemical hygiene plan and safety plan.

2. The Principal Investigator is responsible for ensuring that the laboratory is operating under adequate safety conditions.

3. The Principal Investigators in charge of the undergraduate teaching laboratories and the Technical Associate, who is also a member of the departmental safety committee, will have the responsibility of informing students of good safety procedures and making sure that good safety procedures are in operation.

4. Recommended safety procedures (such as: storage and disposal of hazardous materials) will be made readily available. It is the responsibility of the faculty member (or laboratory director) and the Laboratory Safety Representative to ensure that adequate procedures are in effect. Material Safety Data Sheets can be obtained from the safety office and accessed electronically.

5. Each laboratory will be subject to both announced and unannounced EHS inspections at regular intervals. These will be carried out under the direction of the EHS Coordinators and the Environmental Health Safety Office. A written report will be submitted to the responsible faculty member (or laboratory director) and the Department Head.

6. To see that all occupational accidents or injuries/illnesses are reported within 24 hours using an online accident report. The web address is https://web.mit.edu/hr/restrictforms/injury_report.html

7. To ensure that the department personnel are well informed, e-mail lists are created. Some examples of the EHS e-mail lists are:

    a. minutes of safety committee meetings
    b. location of safety literature
    c. recent incidents/accidents (names omitted)
    d. location of safety seminar and meetings
    e. other relevant material
    f. crime prevention

8. The Department has also fulfilled the OSHA requirement for enacting an Emergency Preparedness Plan on each floor. The EHS Committee will ensure that the personnel adhere to the program. Each laboratory is required to create an emergency preparedness plan. In the event of an emergency evacuation or a chemical spill, a standard operating procedure must be followed by each laboratory group.

9. The Biology EHS Committee meets once a month between September and June. The responsibilities of the committee include:

    a. To ensure that each laboratory has a representative and to inform the Department Head if a laboratory is lacking a representative, as denoted by chronic absenteeism from monthly meetings, indicating that there is no representative. It then becomes the responsibility of the Department Head to ensure that the Faculty Member knows of his/her responsibility to come to the next meeting.

    b. To train new EHS Representatives in what their responsibilities are, how to give the safety interview to new employees, and where to find information people may ask for.

    c. To set up seminars for the safety committee on safety practices and concerns.

    d. To be a resource if there are safety concerns in a laboratory, the department, or the Institute.

    e. To keep the department head informed about safety concerns and new policies.

C. TRAINING PROGRAM

1. All new personnel, students, employees, and UROP's are required to participate in a safety orientation/interview with a member of the Biology laboratory they are joining. The interview consists of a review and discussion of the following:

   a. Lab specific training
   b. Chemical Hygiene Plan
   c. MIT EHS Policies and the Biology Safety Plan.
   d. The Emergency Preparedness Plan (EPP).
   e. Reporting accidents using the online accident form.
   f. Emergency phone number- dial 100 from campus phone
   g. General safety procedures
   h. The concept that safety is a good laboratory technique.
   i. Where they can find safety information if needed.
   j. How to log onto the training needs assessment
   k. A questionnaire concerning safety to fill out, and review with the EHS representative. This allows new personnel to think about situations in terms of safety.
      The questionnaire has a check list which will be reviewed and signed by the EHS rep giving the interview and signed by the principal investigator of the lab group. No personnel, employees or students will be allowed to work in any laboratory in any capacity until this has been completed. UROP's are not issued keys, but they receive the same orientation.
   l. Laboratory Safety Check List is gone over and given to the interviewee.
   m. The new personnel will receive a copy of the Biology Department Safety Plan and Chemical Hygiene Plan.
   n. Infectious agents
   o. Blood borne pathogens (exposure control plan)

   (copies of the Master List of questions and answers, the Accident Report Form, and the Laboratory Check List follow this section)

2. Two questionnaires are located within this Safety Plan. Each questionnaire is to be completed by every person who wishes to work or study in any laboratory located in the Department Of Biology. Once the new lab member completes the questionnaire, it should be corrected by the Lab Safety Rep. and reviewed with the new lab member. Once this is done the Safety Rep. should sign off that the questionnaire has been completed and the new lab member understands the Department's Chemical Hygiene and Safety Plans. At this time, the Principal Investigator should sign the compliance form and it should be returned to Biology Headquarters, so that it can be put in the individual's personnel file. When all of these steps have been taken the new member may begin working in the lab. Under no circumstances can anyone work in the lab until this has been satisfied.

3. Information regarding the location of spill kits, fire extinguishers, breathing apparatus, sprinklers, eye washes, fire alarms, and other safety concerns should be presented to the laboratory EHS Representative. Concerns can also be brought to the attention of the Department's EHS Coordinator, John Fucillo at 3-4711 (room 68-133)

4. Training researchers in the correct methods of handling radioactivity is the responsibility of the Radiation Protection Program (RPP).

5. Each lab is required to maintain a safety shelf.

   This shelf should contain:
   1. Copies of the Department of Biology's Safety Plan and Chemical Hygiene Plan.
   2. A list of commonly used particularly hazardous substances.
   3. Location of spill and emergency response material and directions.
   4. Posted phone numbers for emergency personnel during and after work hours.
   5. SOPs for Laboratory Operations.
   6. Biology EHS Representative Manual

Other resources include:

- **EHS,** x2-3477: Environmental Health and Safety Office. BioSafety, Industrial Hygiene, Environmental Management, Radiation Protection and Safety Programs, are now all together located in N52. During normal working hours Monday through Friday you can contact them at 2-3477. For emergencies during off hours contact the Department of Facilities at 3-1500 or for life-threatening emergencies dial 100 anytime.
- **Safety Program**, x3-4736: for Material Safety Data Sheets and general questions concerning safety.
- **Radiation Protection Program**, x3-2180: any concern about radiation can be directed to this office.
- **Biosafety Program**, x3-1740: questions concerning: recombinant DNA experiments,biological safety; and OSHA required training prior to working with human tissue cells, blood, and/or other body fluids can be directed to them.
- **Industrial Hygiene Program**, x3-2596: can be contacted with questions about hazardous materials as well as clean up in case of a spill or inoperative hoods.
- **Environmental Management Program**2-3477: questions regarding hazardous waste

Laboratory Safety Questionnaire

Each day laboratory personnel use known hazardous and potentially hazardous agents, both chemical and biological. Use safe laboratory procedures at all times. If you do not know what safe laboratory procedure entails, consult your supervisor, the Department of Biology Safety Plan or the Department of Biology Chemical Hygiene Plan, or a member of the Safety Committee, before you perform the intended procedures. Doing so will protect both you and those around you. The following questionnaires are given to all personnel entering the Biology Department. The purpose is to acquaint you with some of the hazards present in every day laboratory experiments and make you aware of safe practices currently in use at MIT. Try to answer as many of the questions as you can by yourself and then check the answers provided. Keep in mind that these are general questions designed to broaden your knowledge of how to handle an emergency situation. There may be several answers to a given question depending on different situations that may arise. After you have read the questions and the answers and understood them, or if you don't understand them, bring this questionnaire to your lab EHS representative for correction and further assistance. You will be required to attend further safety seminars to increase your knowledge of safe procedures. However, this questionnaire and check list should help you to begin work within the lab.

Medical

1. A Massachusetts state law requires all new employees to have a tuberculin skin test. Please go to the Medical Department within the first two weeks of employment. It is recommended that each new employee also arrange for a physical examination at the same time (call ext. 4481 for an appointment).

2. Any accident or exposure should immediately be dealt with by the Medical Department, ext. 1311 (and Radiation Protection Office where appropriate). It should also be brought to the Department's attention through the use of the online Accident Report form.

3. Personnel with special health problems (e.g., being treated with immunosuppressants, with record of previous radiation exposure, hyper-sensitivities or allergies, poor liver function, etc.) should describe their duties and the materials employed to their physician to determine whether they are particularly hazardous to their health.

4. Visitors to the laboratory should be made aware that hazards are present and their medical histories should also be considered. No children should be allowed in laboratories. No pets should be allowed in the laboratories.

5. Pregnant women should consult both their physicians and their laboratory supervisors as to which of their duties are considered safe during pregnancy.

Questions

Emergency Action Plan

1. Do you know what the Emergency Preparedness Plan does?
2. What is the EPP for your floor?
3. Where are the directions for the EPP posted in your lab?
4. Who is the Fire Warden for your lab?
5. Where is the nearest fire alarm and fire extinguisher?
6. There is a mild smell of smoke in your lab. What do you do?
7. What is the emergency phone number at MIT?
8. There is a fire in your lab. What do you do?

Eating

1. Where do you eat your lunch?
2. Is there a designated lounge on your floor?
3. Is it acceptable to drink or smoke at your bench?

Chemical

1. Where would you find information about a chemical which you are about to use for the first time?
2. What is the procedure for cleaning the following spills?
   Acid Thermometer Agar
3. Where is the nearest spill kit?
4. Where is the nearest eye wash and deluge shower?
5. Where is the list of emergency numbers located in your lab?
6. Is there a designated waste disposal person for your lab?
7. You have cut yourself in the lab. What do you do?
8. Somebody collapses in your lab. What do you do?
9. What procedure would you use to dispose of the following chemicals:
   Phenol HC1 Acrylamide Cell Supernatants
   Chloroform HFBAcid Oil

Benzene Unknown Ether

10. How would you store the following Chemicals?
    Ether Acids and Bases Compressed Gases

11. What type of hoods are in your lab?

12. How can you check simply for proper hood ventilation?

13. Who do you call in case of hood malfunction?

14. Please circle which answer(s) is correct for proper use of a hood and then box which answer(s) describes how hoods are used in your lab:

Long term storage	Temporary storage	Noxious chemical storage
Noxious chemical use	Distillation	Radioactive experiments

<u>Radioactive</u>

All persons must register with the Radiation Protection Program before handling radioactive materials and/or radiation producing equipment (ext. 3-2180)

1. What isotopes does your lab use?

2. Who is your lab's radiation officer (if any)?

3. Do you know who should have a radiation badge?

4. How is the ordering and pickup of radioactivity handled in your lab?

5. Do you know where your Geiger counter is located and how to use it?

6. How do you monitor radioactive iodine?

7. Are you aware of where you lab stores radioactive samples?

8. How would you know whether a sample was radioactive?

9. How would you move a radioactive sample if you desired something behind that sample?

10. Where are your radioactive sinks?

11. What are the permissible levels of radioactivity to dump in the sinks?

12. Where do you dispose of solid waste and high level liquid waste?

13. How and where do you dispose of scintillation vials?

14. Should you check out equipment used for radioactivity before or after it has been used?

15. Is radioactivity from other labs brought into your lab and is it used properly?

16. Should you wear gloves, glasses, coats, etc., when working with radioactivity?

17. What type of shielding should you use and is it available in your lab?

18. Where would you get more shielding if you need it?

19. What are you labeling?

20. Are there critical target organs and if so what are they?

21. What is the radioactive waste pickup number?

22. What would you do in case of a spill, ingestion or skin contact?

Biologicals, Blood Borne Pathogens, Infectious Agents

1. What do BL1 and BL2 mean?

2. Where is your MIT Biosafety manual located?

3. Which of the items below is acceptable to mouth pipette?

water	agar	buffers
isotopes	cultures	acids
acrylamide	LB	viruses

4. Do you know the physical manifestations of a lab acquired illness from your particular biological agents and possible contaminants of said biologicals?

5. How would you dispose of syringes and needles?
   Put cap on and throw into wastebasket
   Put cap on and throw into glass box
   Throw into glass box
   Throw into syringe disposal box uncapped
   Throw into syringe disposal box capped

6. What is the proper procedure for disposal of biologicals?
   Throw down the sink
   Bleach
   Autoclave
   Wescodyne
   Lysol

7. Should a bench be decontaminated before and/or after working with biologicals?

8. How would you handle a biological spill?
9. Should you treat human and animal specimens as if they were infectious?
10. What do you do if you are injured while handling an animal?
11. Do you know how to operate an autoclave?
12. What are blood borne pathogens?

<u>High Voltage</u>

1. What is considered dangerous voltage?
2. Is DC more dangerous than AC or vice versa?
3. What should you do if you are going to work late at night?
4. Can you run a gel box on the floor?
5. How do you start up any gel?
6. What types of leads do power supplies of high voltage need?
7. How do you turn off a power supply?
8. Which lead do you disconnect first?
9. What do you do if the hazard indicator light is flashing or not working on your power supply?
10. What do you do if you believe that someone has received an electrical shock?

Answers to the Safety Questions

Emergency Action Plan

1. The EPP prepares people in emergency evacuation procedures.

2. The EAP, which stands for Emergency Action Plan, is different for each laboratory. You must check with your Safety Representative to learn the appropriate methods of evacuation for the laboratory you will be working in.

3. Directions are posted on the bulletin boards in the hall and in the labs.

4. Each lab should have a designated Fire Warden. See your EHS Representative.

5. Fire extinguishers should be in the hall. Check your location. The fire alarm pull boxes are located on each floor near the exits check the location on your floor.

6. Mild smell of smoke - Try to determine the source, look around to determine what it might be, contact John Fucillo to see if he may know the origin, or call Physical Plant at 3-4948; if at all in doubt, pull the fire alarm nearest you.

7. Emergency phone number at MIT is -100.

8. Evacuate and pull the fire alarm. Call -100, tell the location, problem, and your name. Let them hang up first.

Eating

1. Eat lunch in the lounge assigned to your laboratory. Food, drinks, or smoking should not take
2. place in the lab.

3. Each laboratory will have an area designated outside the lab for eating. You should ask your EHS Representative.

4. It is not acceptable to eat or smoke at your bench.

Chemicals

1. Information on chemicals can be found in the Merck Index and from Material Safety Data Sheets, which can be found at the Safety Program or accessed on line.

2. To clean up acid or mercury spills, follow directions on the spill kits, which should be located in your laboratory. See the Principal Investigator.

   If in doubt, call Industrial Hygiene, (3-2596) or call EHS Coordinator, (3-4711 and 4-0050).

   Agar - let cool so you do not burn yourself. Wipe up completely and make sure there is no residue that will make the floor slippery.

3. The nearest spill kit is located in your lab. Ask lab safety representative for location or for large spills and assistance call EHS (2-3477).

4. Check the location of your safety shower and eye wash facility for your lab.

5. All phones should have a list of safety numbers or they can be located in the EHS Emergency Response Guide.

6. Ask your safety rep.

7. If someone cuts himself:
   - Go to the Medical Center to have it treated.
   - Fill out the Accident Report Form online.

8. Someone collapses in your lab:
   - Check for possible causes; fumes, shocked by power supply, etc.
   - If there is existing danger, you should try to remove the person from harm. If no danger is present, keep the person as comfortable as possible until help arrives.

9. The procedure for disposing of the chemicals.
   - Ask your EHS rep.
   - To dispose of unwanted labeled chemicals, call (2-3477) to make arrangements for a pick-up.
   - Any questions about chemical disposal can be directed to the EMP.
   - All chemicals must be labeled at all times.

10. Storage of ether should be in a well ventilated under hood, away from heat sources or oxidants/reductants.
    - Acids and bases: store away from flammable materials.
    - Compressed gas: attach to a wall or a bench not standing alone.

11. Each laboratory should have a chemical fume hood. Check with your laboratory supervisor.

12. A simple test to see that the hood is working is to tape a Kimwipe or string to the sash to see if there is movement.

13. If the hood is not working, call Industrial Hygiene, 3-2596.

14. Proper use for a hood is temporary storage, noxious chemical use, distillation of volatile chemicals.

<u>Radioactive Materials</u>

1. Consult your safety rep. for the laboratories in which you work.

2. Your safety rep. will direct you.

3. People using ^{14}C do not need one, but you should check with the Radiation Protection Program if you have any questions concerning a radiation badge.

4. To order radioactive chemicals the order must be approved by the Radiation Protection Program (RPP).

    - The requisition must be brought over to Purchasing with the Radiation Authorization number written on it.
    - Purchasing will check with RPP to ensure you are authorized to order the isotope and verify the quantity allowed.
    - When approved, you will be given the P.O. number which allows you to order the isotope.
    - Pick-up of radiation waste - Call Radiation Waste disposal (3-3674) designating what and where the waste is to be picked up.
    - All questions concerning work with radioactive materials should be directed to the Radiation Protection Program at (3-2180).
    - It is the responsibility of the Principal Investigator to see that anyone in the laboratory who is working with radioactive materials is approved by the Radiation Protection Program.
    - A Geiger counter must be maintained by any lab using radioactive materials. Contact RPP for instruction on use and care, and also how to acquire one.

5. Each laboratory using radioactive materials is required to have a Geiger counter. Check with your laboratory safety representative. (Below are instructions for use.)

    - Turn on the batteries and check that there is enough power.
    - Turn the knob to the required sensitivity.
    - Read the gauge.
    - Remember to turn off the counter.

6. By a different Geiger counter tube used for radioactive iodine.

7. Ask your safety rep.

8. All samples of radioactive materials must be labeled radioactive.

9. If someone needs to move radioactive material, it is advisable to use PPE.

10. Radioactive sinks are designated by large labels with recording information and a file folder to list levels and amounts that can be disposed of down the drain. This form must be filled out when disposing of radioactive materials down the drain.

11. Maximum levels of radioactivity allowed down the drain are:
    ^{3}H one $\mu Ci/ml$,
    ^{14}C $0.2\mu Ci/ml$,
    ^{32}P 5×10^{-3} $\mu Ci/ml$,
    ^{125}I 4×10^{-4} $\mu Ci/ml$,
    ^{35}S 2×10^{-2} $\mu Ci/ml$

12. Solid and liquid waste should be disposed of in containers issued by the RPP and levels should be recorded.

13. Scintillation vials are put into a plastic bag, labeled, and put into the radioactive scintillation waste drum.

14. Check equipment for radioactivity before and after use.

15. Radioactive material is not to be brought from one lab to another.

16. Always wear gloves, lab coat, and glasses when working with radioactivity.

17. Shielding is to be used for ^{32}P experiments. Use thick Plexiglas shields, microfuge tube racks and a Plexiglas containment holder for ^{32}P stock vials.

18. Shielding can be obtained from RPP, (3-2180).

19. All radioactive materials in lab.

20. Critical organs would be any dividing cells in the body; that is synthesizing proteins and DNA. Some examples are gut flora, hair, and reproductive tissue.

21. The radiation pickup number is (3-3674).

22. In case of a spill on your bench, it should be covered by a lab bench soaker. Pick it up, put it into a plastic bag and call RPP (3-2180) to determine what they want you to do with it.

    - If you spill it on an unprotected place, contain it, warn people to avoid it and call RPP, (3-2180).
    - If you ingest some, go to the medical department and inform them you have ingested radioactive material. Call RPP (3-2180).

<u>Biological</u>

1. BL1 and BL2 are the designations of the biological containment level of the laboratory, i.e. how the lab insures that the organisms do not get into the environment. The more pathogenic the organisms used, the higher is the containment level.

2. Ask safety rep.

3. There is no acceptable agent, including water, to be mouth pipetted.

4. Example: The King Lab uses Salmonella typhimurium LT2 even though this strain is not pathogenic. If they are experiencing diarrhea, vomiting, or cramps, they should see a doctor and inform the doctor what they work with.

5. Answer d.

6. Biologicals must be inactivated by one of the following: bleach, autoclaving, Wescodyne or Lysol. Once inactivated, liquids can go down the drain. Solids are segregated from standard trash, labeled and picked up by janitors.

7. Benches should be decontaminated before and after use by washing bench area with bleach, Wescodyne, Lysol or their approved method.

8. A biological spill should be decontaminated first, then wiped up and discarded as noted above in #6.

9. Always treat human and animal specimens as if infectious. If you work with human source materials contact the Biosafety Program for OSHA blood borne pathogen training.

10. If injured while handling an animal, go to the Medical Center for treatment. Inform the Safety Program (3-5746) of the injury and fill out an accident report form. Give it to your Safety Representative or one of the EHS Coordinators.

11. One should be properly trained in the operation of the autoclave.

12. Micro-organisms that might be present in the human tissue e.g. HIV, hepatitis.

<u>High Voltage</u>

1. Any voltage should be treated as if it is dangerous.

2. AC current is the most dangerous.

3. If someone is working late, they should inform another person on the floor they are there. If proceeding with a dangerous experiment. it is advisable to have someone check-in periodically.

4. Gel boxes should not run on the floor because they can be tripped over.

5. Start up a gel by connecting the black lead first as a ground and then the red lead.

6. It should be noted that high power leads should be used when running a sequencing gel with high voltage.

7. Turn off a power supply by turning down the voltage source, then turn off the power.

8. After turning off power, disconnect the red (positive) lead first.
9.
10. If the hazard light is flashing on the power supply, turn it off and determine what the problem is and fix it, or have it fixed.

11. If someone is unconscious, call x100 which is the emergency phone number at MIT.

DEPARTMENT OF BIOLOGY
CHEMICAL HYGIENE PLAN QUESTIONNAIRE

1. The purpose of the Chemical Hygiene Plan is to
   (a) Protect employees and students through proper work procedures.
   (b) Keep chemicals from impurities.
   (c) Proper way to neutralize chemicals.
   (d) Ensure compliance with rules and regulations.

2. Is there a Chemical Hygiene Officer or a Chemical Hygiene Committee in the Department of Biology?
   (a) Chemical Hygiene Officer
   (b) Chemical Hygiene Committee

3. Who is the Chemical Hygiene Officer for the Department of Biology?
   (a) John Fucillo
   (b) Professor Phillip Sharp
   (c) Laboratory Supervisor
   (d) There is none; there is only one at the Institute.

4. As listed in the Chemical Hygiene Plan, which duties are the responsibility of the lab supervisor?
   (a) Ensure all work is conducted in accordance with the Chemical Hygiene Plan.
   (b) Define the location of work areas where toxic substances and potential carcinogens will be used.
   (c) Create, review, and approve standard operating procedures and training of such procedures.
   (d) All of the above

5. Are non-employees who are not under the direction of a laboratory supervisor, but are in an area which is under the direction of a Biology Department laboratory supervisor subject to the Department of Biology's Chemical Hygiene Plan?
   (a) Yes
   (b) No

6. What is the responsibility of an employee concerning the Chemical Hygiene Plan?
   (a) Understand and follow all standard operating procedures.
   (b) Understand all training received.
   (c) Report in writing to the lab supervisor any significant problems arising from the implementation of a standard operating procedure.
   (d) All of the above.

7. Which of the following people are allowed in a laboratory unaccompanied by any lab personnel even though they are not trained in the Chemical Hygiene Plan?
   (a) Employee's visitor.
   (b) Salespeople.
   (c) Repair personnel.

(d) No one is allowed.

8. Which person in the laboratories have the responsibilities of identifying and classifying hazardous chemicals?
   (a) Safety representative
   (b) Lab supervisor
   (c) Industrial Hygiene Officer
   (d) Director of Safety Office

9. What is one way of obtaining an MSDS (Material Safety Data Sheet)?
   (a) Contact the Safety Program (3-4736)
   (b) Ask co-employee
   (c) Ask lab supervisor
   (d) See the Chemical Hygiene Officer

10. What should the first step be in evaluating a new experiment?
   (a) Investigating the possibility of eliminating the use of a hazardous material by substituting a less hazardous chemicals.
   (b) Purchasing material needed to perform experiment.
   (c) Find a suitable location to perform experiment.
   (d) None of the above.

11. How is potential exposure to a particularly hazardous chemical reduced according to the Chemical Hygiene Plan?
   (a) Non-use
   (b) Designated area signs.
   (c) Emergency notification signs.

12. Which of these areas can be used as a designated area?
   (a) Hood or glove box.
   (b) Bench
   (c) Entire lab
   (d) All of the above
   (e) None of the above

13. Who shall provide training for the Department of Biology's Chemical Hygiene Plan?
   (a) The laboratory supervisor or someone s/he appoints.
   (b) Safety Office
   (c) Safety committee
   (d) Biology Headquarters

14. According to the Department of Biology's Chemical Hygiene Plan what are the 4 steps of the general standard operating procedure for handling any hazardous chemicals?

   (a) _____

   (b) _____

   (c) _____

   (d) _____

15. Which of the following must be included in all Standard Operating Procedure?
    (a) Date experiment takes place
    (b) Person doing research
    (c) The use of personnel protective equipment
    (d) None of the above.

16. Where does one acquire a respirator?
    (a) Lab supplies
    (b) Outside vendor
    (c) Safety Program
    (d) Industrial Hygiene Program

17. When using a Chemical Fume Hood, where should a researcher set up the work?
    (a) At lease six inches behind the plane of the sash.
    (b) Outside the hood on a cart.
    (c) On a shelf in rear of hood.
    (d) It makes no difference as long as it's behind the sash.

18. What maintenance should a researcher do before working on a specific chemical fume hood?
    (a) Make sure hood is uncluttered.
    (b) Clean grill along bottom slot.
    (c) Report any hood malfunctions to IHP (3-2596) or EHS Coordinator.
    (d) All of the above.

19. Where in the lab is it acceptable to eat, drink, smoke, or apply cosmetics?
    (a) At desk
    (b) On Bench
    (c) Near open window
    (d) It is not allowed anywhere in the lab.

20. What information should be found on an emergency notification sign which are located at all entrances to all laboratories?
    (a) Building and room number.
    (b) Department
    (c) Supervisor's name
    (d) Names and phone numbers of key personnel who can be contacted in the event of an emergency.
    (e) All of the above.

21. What containers need labels?
    (a) All containers containing any chemicals including water.
    (b) Containers used for storage
    (c) Chemical containers in cold rooms
    (d) Containers only used for disposal

22. Name one location where MSDS can be found. _____

23. What does MSDS stand for? _____

24. Who's responsible for seeing that chemicals are disposed of properly?
    (a) Safety Program
    (b) Laboratory Supervisor
    (c) EMS
    (d) The individual who has created the waste.

25. When should you plan a procedure for waste disposal?
    (a) When cleaning a lab bench
    (b) When a hood becomes cluttered.
    (c) When there is no room left to store more chemicals.
    (d) Before you start a project.

26. According to the Chemical Hygiene Plan, which answer below is correct?
    (a) Unknown and unlabelled chemicals cannot be disposed.
    (b) All containers of waste must have red tags stating contents.
    (c) Waste chemicals in breakable containers of one gallon or larger size should be kept within approved secondary containers.
    (d) All of the above.

27. What must a laboratory do when requesting a chemical pick up from the Safety Program?
    (a) Bring chemicals to storage shed.
    (b) Remove all labels.
    (c) Fill out a packing list and make sure all containers are properly labeled.
    (d) All of the above.

28. Who is responsible to inform employees/students of exposure risks to hazardous situations?
    (a) EMP
    (b) Safety Program
    (c) Employees/Students should be aware of risks on their own.
    (d) Laboratory Supervisor

29. Name the person responsible for maintaining and establishing records for training of the Department of Biology's Chemical Hygiene Plan?
    (a) Department Chairman
    (b) Safety Program
    (c) Chemical Hygiene Office
    (d) Principal Investigator

30. When should a respirator be tested for fit?
    (a) When obtaining one.
    (b) Before acquiring one.
    (c) Once a month.
    (d) Every time it is worn.

DEPARTMENT OF BIOLOGY
CHEMICAL HYGIENE PLAN QUESTIONNAIRE
ANSWERS

1. A. Protect employees and students through proper work procedures.

2. A. Chemical Hygiene Officer

3. A. John Fucillo

4. D. All of the above.

5. A. Yes

6. D. All of the above.

7. D. No one is allowed.

8. B. Lab Supervisor

9. A. Contact the Safety Program (3-4736)

10. A. Investigating the possibility of eliminating the use of a hazardous material by substituting less hazardous chemicals.

11. B. Designated area signs.

12. D. All of the above.

13. A. The laboratory supervisor or someone s/he appoints

14. A. Identify chemicals being used

    B. Research chemicals on MSDS

    C. Follow recommendation on MSDS

    D. Follow guidelines set by the Safety Program, EHS, and EMP for purchase storage use and disposal.

15. C. The use of personnel protective equipment.

16. D. Industrial Hygiene Program

17. A. At least six inches behind the plane of the sash.

18. D. All of the above.

19. D. It is not allowed anywhere in the lab.

20. E. All of the above.

21. A. All containers containing any chemicals including H_2O.

22. Through the Safety Program

23. Material Safety Data Sheet

24. D. Individual who has created the waste.

25. D. Before you start a project.

26. D. All of the above.

27. C. Fill out a packing list and make sure all chemicals are labeled properly.

28. D. Laboratory Supervisor.

29. D. Principal Investigator

30. D. Every time it is worn.

Department of Biology's Safety Program
Compliance Form

This sign off sheet is to confirm that _____has completed the following:
(Please Print)

- ☐ Read & fully understands the Biology Safety & Chemical Hygiene Plans
- ☐ Completed Biology Safety Plan Questionnaire
- ☐ Completed an interview and lab specific training with Lab EHS Rep
- ☐ Logged into the EHS training website to complete Training Needs Assessment
- ☐ Reviewed the Emergency Action Plan for specific area

Signature of Applicant _____Date_____

Title/Position of Applicant_____ **MIT ID #**:_____

MIT Address:_____ **MIT Phone**:_____

Kerberos user name of Applicant _____

Signature of Interviewer (EHS Rep) _____Date_____

Signature of Faculty or
Principal Investigator _____Date_____

This completed form is to be turned into the Biology Headquarters for approval of the EHS Coordinators before work begins in a lab. Keys will be issued at this time. The applicant agrees to take responsibility for the access card & keys and will return these items upon conclusion of their work with the Biology Department.

Approved by_____ Date_____

For Office Only:
Access Card #:_____ Date of Issue:_____
___New Issue ___Renewal ___Replace Card #

Access Code Group ___1 ___ 2 ___ 3 ___4 ___ 5
___6 ___ 7 ___ 8 ___9 ___ 10

Approved by _____ Date_____

Biology Safety Committee Members

Committee member information is available upon request in Biology Headquarters in Building 68 Room 132.

(Post this near your telephone)

DIAL 100 TO REPORT EMERGENCIES AT MIT

FIRE	also activate the nearest fire alarm
MEDICAL	serious accident, injury, or illness requiring an ambulance, doctor or first aid
SECURITY	requiring Campus Police response
SPILLS	chemical, hazardous, radioactive, toxic

This telephone is answered by Campus Police 24 hours a day. Stay on the line until Campus Police hangs up.

Additional information (and phone numbers) can be found in the MIT Emergency Response Guide (red and white flip-chart located by the lab phones)

ENVIRONMENTAL HEALTH & SAFETY

Information & Assistance

	MIT Phone numbers 9am - 5pm	24 hours
BioSafety Program	3-1740	3-1500 / 3-4481
Building Maintenance/Local Zone A	8-9423	3-4948 / 3-1500
Campus Police (information)	3-1212	
Chemical Hygiene Officer for your Department (John Fucillo)	3-4711	
Chemical Waste Pick-up Requests	3-4736	
Environmental Health and Safety Office	2-4733	3-1500 / 3-4481
Environmental Management Program	2-4733	
Electrical and Fire Safety Hazards	3-4736	
Fire Safety Equipment Repair		3-4948
Fume Hood Monitoring	3-2596	
Fume Hood Repair		3-4948
Handicap Access	3-4861	
Handicap, keyed entry	3-4736	
Industrial Hygiene Program	3-2596	3-1500 / 3-4481
Gas Leaks and Other Odors		3-4948
Laser Safety	3-2180	
Material Safety Date Sheets (MSDSs)	3-4736	
Physical Plant Operations Center		3-1500 / 3-4948
Radiation Protection Program	3-2180	3-1500 / 3-4481
Radiation Waste Pick-up Requests		3-3674
EHS Coordinator:		
for your dept.: John Fucillo	3-4711	
for your lab: _____	_____	
Safety Info, Electronic Access to	3-4736	
Safety Program	3-4736	3-1500
Workers Compensation	3-4736	

EHS ORGANIZATION AT MIT

INSTITUTE EHS SERVICES

Full information can be found at the web site:
http://web.mit.edu/environment/environmental/index.html

MIT ENVIRONMENTAL HEALTH AND SAFETY OFFICES
N52-496, ext. 2-3477

ELECTRICAL SAFETY TIPS FOR RESEARCHERS

1. DESIGN FOR SAFETY. Consider safety as an integral part of the experimental design process. Check with your EHS Coordinators for sources of electrical safety review. Protective devices, warning signs or labels, and administrative procedures only supplement the design. These can never take the place of engineering controls, such as ground fault interrupters, that were built into the experimental design.

2. RESIST "HURRY-UP" PRESSURE. Work pressures can cause even the most seasoned veteran to momentarily forget safe habits. Resist the temptation to take unsafe short-cuts to save a few minutes.

3. IDENTIFY HAZARDS AND ANTICIPATE PROBELMS. Think through what might go wrong and the possible consequences.

4. DE-ENERGIZE EQUIPMENT BEFORE WORKING ON IT. Always disconnect at the source and work towards the load. Then ensure that the equipment remains safe after de-energization by following your department's shut-down and notification procedures. If energized equipment must be worked on, the operation's potential hazards should be carefully reviewed to develop specific procedures.

5. PREPARE EMERGENCY PROCEDURES. All personnel working in areas with high hazard electrical equipment should be trained in emergency response procedures, including cardiopulmonary resuscitation. A "panic" switch that disconnects the main power to an area in an emergency should be located near an exit and legibly marked.

6. PRACTICE PROPER HOUSEKEEPING. An orderly work area minimizes the possibility of tripping and falling into live equipment, fires, and many other kinds of accidents. OSHA requires 36 inches of space around electrical equipment with more than 600 volts.

7. MAINTAIN EQUIPMENT FOR SAFETY. Good maintenance is essential to safe operations. Experimental designs should provide for the safe maintenance of equipment including procedures, schedules and records.

8. DOCUMENT YOUR WORK. Always update documentation, such as: prints, operational procedures, maintenance manuals and logs. These should be available to anyone working on potentially hazardous electrical equipment.

9. PERIODICALLY ATTEND SAFETY SEMINARS. To avoid complacency about electrical hazards, b aware of the current safety procedures and of the accidents that have occurred at MIT. Both of these may be covered during your department's safety seminars.

Excerpted from the National Safety Council's Research and Development Newsletter, January-February, 1987

MIT ENVIRONMENTAL HEALTH AND SAFETY OFFICES
N52-496, ext. 2-3477

CONDENSED FIRE SAFETY PROGRAM

HOW TO REPORT A FIRE

1. Pull the nearest fire alarm pull station, usually located near exit doors and stairs.

2. Dial 100
   Give your name, location and the type of fire or other emergency. (Stay on the line until the dispatcher hangs up).

EVACUATION

1. Know two ways out.

2. Use enclosed stairwells if available. Enclosed stairs are surrounded by walls and have an entrance door that protects the stairs from the rest of the the building. It is designed and constructed to protect the stairs from fire and smoke.

3. Never take an elevator in a fire building. Elevators provide opportunities to to trap yourself.

4. Leave the building
   Move away from lobbies and entrances.

WHAT YOU SHOULD KNOW ABOUT THE FIRE ALARM

1. Know what your fire alarm sounds like. (Is it bells, horns, whoopers, flashing lights, bull horns, an intercom system?).

2. Evacuate immediately if you hear the fire alarm.

3. Continue evacuating even if the fire alarm stops before you exit the building. (Some of our alarms are short in duration, or there could be a power loss due to the fire.

4. Don't assume the fire alarm is a false alarm. Doing so can set you up to be trapped.

5. Be aware that at MIT fire alarms are used for the following emergencies:
   a. fires
   b. chemical spills
   c. flammable gas
   d. toxic gas leaks
   e. bomb threats
   f. other emergencies

SMOKE

1. Fear smoke. Remember, it is the killer in virtually all fires.

2. Avoid passing through smoke if an alternative is available.

3. If you must pass through smoke, keep low, crawl. The air is cleaner and cooler

down low.

4. A wet towel held over your breathing passages may aid breathing, but it doesn't filter out poisonous gasses and is no substitute for fresh air.

Additional information can be found in the Department of Biology's Emergency Preparedness Plan and the MIT Emergency Response Guide.

AN EASY WAY TO DEVELOP AN EVACUATION PLAN

(For work or home)

1. Use a floor plan or a sketch or your work area or home.

2. Locate at least two exits or exit stairs remote from each other. (You don't want them too close because if smoke or fire blocks one, it could also block the second if it is too close).

3. Color exits and exit stairs red.

4. Connect the two exits with corridors or pathways in a yellow band. (This represents two directions of travel - from exit A to exit B, or exit B to exit A).

5. Test the plan by attempting to get to an exit and imagine it blocked with smoke or a wall of flames. (Do this on paper and in your mind first, then try it out with an actual evacuation drill). Does your plan provide an easy alternative to get out? If not, what can you do to make it better?

6. If it does provide an easy alternative to escape, you've done it! Congratulations! If not, you may have to think about it more or come up with a creative alternative. Still stumped? Call the Safety Program or your local fire department for advice.

FIRE PREVENTION

Things You Can Do

A. Evaluate and analyze your own areas. Just use common sense. What it the most likely thing to cause a fire and what can you do about it?

B. Practice good general housekeeping. Avoid clutter that permits fire to spread rapidly and throw out combustibles that you no longer need.

C. Practice good specialized housekeeping. This includes keeping everything stored in their proper places, for example, flammable liquids in safety cans and flammable liquid cabinets, and keep chemicals and gases properly stored in hoods or storage areas with compatible chemicals and gases. Electrical wiring and equipment should be kept in good condition. Cracked, frayed, or damaged wiring, and antiquated equipment of a suspicious nature should be discarded. Avoid overloading outlets and eliminate use of extension cords.

D. Try to keep ignition sources, fuel, and oxidizers separate and isolated as possible. Whenever possible, eliminate fuel loads and ignition sources...see C.H.P. for information on storing solvents, oxidizers and reactive chemicals.

E. Develop safe working habits and correct poor ones.

F. Maintain your own good fire safety attitude and try to instill it in others. Don't permit

others to compromise your safety.

G. Ask for help from the Environmental Health and Safety Office (2-3477) if you need it.

MIT ENVIRONMENTAL HEALTH AND SAFETY OFFICE
N52-496, ext. 2-3477

FIRE, EMERGENCY, AND RESCUE PROCEDURES
Norman V. Steere

SOME UNEXPECTED PROBLEMS IN LABORATORIES (Things to think about)

1. FIRE involving one or more laboratories
2. CHEMICAL spills in corridors and laboratories
3. SPILLS of radioactive materials
4. RELEASE of compressed toxic and corrosive gases
5. FAILURE of power to laboratory hoods
6. ESCAPE of pathogens
7. EXPLOSIONS & injury of a person working alone or in an isolated area

PRIMARY EMERGENCY PROCEDURES

1. ALERT personnel in the immediate vicinity of a fire or emergency
2. CONFINE the fire or emergency
3. EVACUATE the building
4. SUMMON aid
   a. At MIT, use nearest fire alarm box and dial 100
   b. Inform and advice emergency personnel

FLAMMABLE LIQUIDS

1. "The more volatile liquids heat up to 10 times faster than wood planking, and their vapors form explosive mixtures with air."
2. Respect them, they can be very dangerous.

SEVEN BASIC SAFEGUARDS FOR SAFE HANDLING OF FLAMMABLE LIQUIDS

1. ISOLATE the hazards.
2. CONFINE the liquid.
3. VENTILATE to prevent explosive mixtures.
4. INSTALL explosion vents where needed.
5. ELIMINATE ignition sources
6. EDUCATE employees in hazards and safeguards.
7. PROVIDE adequate fire protection.

*Excerpted from the Handbook of Laboratory Safety, 1967, The Chemical Rubber Co.

PRESCRIPTION SAFETY GLASSES

The following procedures apply to persons who need prescription safety glasses:

- Each laboratory must furnish one pair of prescription ground, shatterproof eye glasses free of charge to employees whose work requires their use.

- (S)he must work on a job that requires eye protection, and his/her supervisor and the Safety Program must approve all requests for prescription glasses.

- A special form, available at the Safety Program must be filled out by a qualified eye specialist. This form should be accompanied by a departmental requisition when presented to the Safety Program for processing.

- The employee must bear all costs of obtaining a current examination as well as any cost of having the glasses fitted.

- In case of change in the condition of the eyes, new glasses will be furnished consistent with the policy. A new prescription is needed for any glasses more than one year old. Bifocal lenses will be furnished when necessary.

- Non-prescription eye protection is available in the tool cribs or at the Office of Laboratory Supplies for those employees who do not require corrective lenses.

POLICY ON SAFETY GLASSES

In the Department of Biology it is strongly recommended, though not mandatory, that safety glasses be worn at all times in the laboratories. However, safety glasses must be worn while working with or near any procedure, chemical, or equipment that has the potential to cause eye damage. Finally, it is mandatory that safety glasses be worn when the Standard Operating Procedure calls for using them or when directed by the Principal Investigator of the laboratory.

SAFETY GUIDELINES FOR STAFF WHO WEAR CONTACT LENSES

Contact lenses can pose special problems in the work environment:

- They can absorb chemical fumes.
- They can allow long and intimate contact of toxic chemicals with the eye.
- They can trap chemicals and particles in the space between the contact lens and the eye.
- Lenses can be difficult to remove in an emergency due to muscle spasms of the eye.
- Flushing with large amounts of water may not remove eye contaminants if contact lenses remain in place.

Employees who work in locations where there is a risk of eye injury, including punctures, abrasions, contusions, or burns as a result of contact with flying particles, hazardous substances, or projection of injurious light rays must wear adequate face or eye protection. Employees who work in these environments and who wear contact lenses must wear medically approved eye protection.

If you are uncertain of the effect of your work environment on your contact lenses, you are advised to exercise prudent measures by always wearing goggles, safety glasses, or face shields when in doubt. If it is determined that protective equipment is needed, its use must be reviewed first by the EHS Office.

If you wear contact lenses at work, inform your supervisor and co-workers of this fact so that proper emergency measures can be taken if necessary.

When working in an area where chemicals or other harmful materials are used, wash and rinse your hands thoroughly with soap and water before handling contact lenses. This procedure applies even if gloves were worn.

Never leave or store contact lenses in any room where volatile chemicals are present.

Please call the EHS Office at 2-3477, if you have any questions or concerns.

*Source: "On Guard," Health & Safety Newsletter, Stanford University, Vol. 3, No. 10, July 1986. SD/005

WHY AREN'T ELEVATORS SAFE TO USE DURING A FIRE ALARM?

The reasons elevators are dangerous in a fire are:

1. Fire, heat, and smoke have a propensity for shafts and other vertical openings. The elevator shaft acts like a natural chimney. Imagine the elevator car as a box suspended by a string in a chimney with people in it. Taking an elevator in a fire building can create a similar risk.

2. It is not uncommon to lose electrical power in a building during a fire. Occupants in an elevator risk becoming trapped in the shaft. By the way, most elevators do not have emergency electrical power.

3. Some elevators have heat sensitive call buttons on each floor. A fire next to the call buttons could bring the elevator to the fire floor. When the doors are opened, the occupants are likely to encounter a wall of fire, heat, and smoke.

4. Should the elevator stop on the fire floor, the electrical eye of some elevators can become clouded by smoke and the doors remain open exposing the occupants to smoke, heat, and flames.

5. The elevator can also stop on the fire floor because someone pushed the button for the elevator to get off at the fire floor. We have experienced this problem here at the Institute.

6. The elevators can act as giant pistons pushing fire and smoke to other portions of the building.

7. In all of the above, the elevator occupant has absolutely no control over the situation. Unwary or careless passengers can quickly become victims.

In conclusion, take the stairs. It really is the safer thing to do unless otherwise directed by fire department or emergency personnel. If you encounter smoke, seek another exit.

ACCIDENT CAUSES

Here are ten principle factors which cause unsafe work practices or unsafe acts by the individual.

1. DID NOT KNOW HAZARD EXISTED - This may be from a lack of experience, inability to recognize hazardous condition, a temporary created by a follow employee, a chain of circumstances, or a lack of job training.

2. INDIFFERENCE - The individual may know the safe method, but may not care; this can be a temporary or continuing attitude. It is necessary that supervisors insist that certain standards be met by employees under their supervision.

3. DARING - This type of behavior blinds an individual of hazards that exist.

4. POOR WORK HABITS - From doing the same job day after day, poor work habits are often formed. Some may be formed early in the job and others may be developed later. This can be seen when an individual works may years and suddenly becomes an accident victim. He may have had poor work habits all along, and the law of averages finally caught up with him.

5. POOR EXAMPLE SET - A new employee may follow the example of an older employee who has unsafe work practices or habits.

6. LAZINESS - A person may be lazy and cause damage unintentionally.

7. HASTE - The desire to get something done fast can cause an injury or an unrealistic speed-up on the job.

8. TEMPER - This can also be classified as impatience or lack of emotional control which can lead to an unsafe act.

9. PHYSICAL FAILURE AND FATIGUE - The individual may have physical limitations; he may be on a job he cannot handle properly. This may be because of poor eyesight, hearing, or general health.

10. LACK OF TRAINING ON THE JOB - This can be the most glaring cause. A supervisor should be certain that each employee knows his job; if he does not, the supervisor is failing in his job. Lack of job training is a handicap. A supervisor has a responsibility to the employee as well as to the employer in carrying out necessary job training.

*Source: Excerpted from: "On Guard", Health & Safety Newsletter, Stanford University, Vol. 3, No. 10, July 1986.

MIT WORKERS COMPENSATION
CLAIMS PROCEDURES FOR EMPLOYEES WHO
SUSTAIN A JOB RELATED INJURY OR ILLNESS

MIT is self-insured for Worker's Compensation for injuries occurring on or after Sept. 1, 1988. This program was administered by the Safety Program, but now it is run by Human Resources in accordance with

MGL Chapter 152 and Section 4.7 of the MIT Personnel Policy Manual.

1. An Employee must seek medical attention immediately at the MIT Medical Dept. and notify his/her supervisor as soon as possible after an injury or the onset of an industrial illness.

   Follow up treatment, if necessary, may be with a physician of their choice. This would include but not be limited to the MIT Medical Department, a personal physician, hospital or H.M.O.

2. Employees must return to work after receiving medical attention for an injury or illness unless the treating physician indicates they have been disabled and cannot work. If disabled, the employee must see to it that the treating physician submits a written report to the Safety Program. This report must contain a description of the accident; medical diagnosis, prognosis, and specific dates that the employee cannot work in order to receive pay for lost wages. The Safety Program is unable to accept claims for disability and/or medical bills, until it has received all the information required by this report. This must be done, for <u>every</u> alleged recurrence. Assessments regarding disability cannot be made retroactively.

3. If an employee is claiming a recurrence of a prior injury or illness, he/she must obtain a report from the physician stating the exact diagnosis that includes the connection between the present disability and the prior work-related injury/illness.

4. If an employee is out of work at least six consecutive days of work, upon acceptance of the claim, MIT will compensate him/her for lost wages at the rate of 60% of their average weekly wage predicted on the prior fifty two (52) weeks earnings with limits established yearly by state law. These payments are tax-free.

5. If an employee opts to use sick leave while out on an industrial accident, the Worker's Compensation checks must be returned immediately to the Safety Program, who will process the necessary paperwork to restore sick leave credits. (Note: the employee is not entitled to more than one check for the same pay period, i.e. either the Payroll or Worker's Compensation check <u>MUST</u> be returned).

6. An employee is responsible for keeping his/her supervisor informed of the status of their disability on a regular basis. If an employee's situation changes, i.e. he/she is hospitalized, admitted to therapy etc., the supervisor must be notified by the employee.

7. Worker's Compensation rates for medical bills are set by the Commonwealth of Massachusetts. Therefore, employees must not use BC-BS or any other medical plan coverage or personally pay medical bills. If an employee pays industrial accident bills they may not be reimbursed for the

full cost of these payments. All bills are to be sent to the Safety Program for processing. Employees should make it clear to the medical provider that they are making a claim for Worker's Compensation, and request that all corresponding reports/records, etc. also be sent to the Safety Program. The bills will not be considered for payment without these records.

8. If an employee refuses to return to work in either a full duty or restricted duty capacity after being medically cleared, Worker's Compensation payments will be stopped.

9. MIT can request that the employee be examined by an independently appointed physician. The appointment must be kept. If these scheduled appointments are not kept, all future Worker's Compensation payments may stop.

10. Employees returning to work from job related injury/illness must go to the MIT Medical Dept. and request a "back to work slip", (a clearance after an industrial accident) before returning to the job regardless of how long they were out or who treated them while they were out with an injury or industrial illness.

Remember, no two industrial accident claims are exactly alike. Following these guidelines will facilitate the processing of your claim.

Employees can contact the Safety Program at any time for updated information about their industrial accident claim.

EMERGENCY NOTIFICATION SIGNS

Emergency Notification Signs should be located on the outside of all laboratory doors.

The purpose of these signs is to notify EHS and the Cambridge Fire Department who may have to enter a laboratory a contact person's name and phone number as well as an alternative if the P.I. cannot be reached. This contact person should have information pertaining to safe procedures and warnings of contents of the laboratory.

HAZARD COMMUNICATION PROGRAM

The Occupational Safety and Health Act requires MIT to inform employees (and students*) about the Institute's Hazard Communication Program and the requirements of the Federal Right to Know law. These are summarized below. Your supervisor and department are responsible for providing you with safety information and/or training on:

- MIT Policies and Procedures on Environmental Health and Safety
- Material Safety Data Sheets (abbreviated MSDS)
- Labeling requirements for all hazardous materials
- The location of the hazardous material inventory of your work area
- Any operations in your work area that involve hazardous chemicals and the associated health and safety hazards
- Safety precautions
- Emergency procedures
- The hazards of tasks done infrequently

*Although OSHA requires that only employees who are exposed to chemicals be given training, the Institute Council on Environmental Health and Safety requires that students be given the same safety information and training as employees.

The OSHA Communication Standard and MIT's written Hazard Communication Program are on file in the EHS Office and will be made available to any member of the MIT Community, upon request.

OSHA BLOOD BORNE PATHOGEN PROGRAM

Administered through the BioSafety Program, Principal Investigators are responsible for ensuring an exposure control plan and personal protective equipment is available for all employees or students who may be exposed to human blood, body fluid, or tissue in the course of their work. Supervisors must also arrange for documented training by calling the BioSafety Program. Hepatitis B vaccines are offered at the training free of cost.

MIT ENVIRONMENTAL HEALTH AND SAFETY OFFICE
N52-496, ext. 2-3477

Material Safety Data Sheets (MSDSs) are prepared by manufacturers to summarize the health and safety information about their products.

TO OBTAINS MSDSs:

- •use Electronic Mail. (refer to the Quick Guide on Electronic Access to MSDSs)
- •or, use your laboratory's or department's MSDS file,
- •or, call the Safety Program, which maintains MIT's central MSDS file,
- •or, call the manufacturer

Below is the most important information that OSHA requires to be on an MSDS. For assistance with interpreting and applying this information to your experiment or work situation, consult with the Industrial Hygiene Program (x3-2596) and/or the Safety Program (x3-4736).

IDENTITY

- •Trade name used on the label and inventory list
- •Manufacturer's name, address, and emergency telephone number
- •Preparation and revision dates

HAZARDOUS INGREDIENTS

- •CHEMICAL and COMMON NAMES of all the hazardous components
- •MAXIMUM OCCUPATIONAL LIMITS OF EXPOSURE
- •Threshold Limit Value: ACGIH TLV
- •Permissible Exposure Limit: OSHA PEL
  - -These are not proven safe levels of exposure. If the exposure limit is not listed, don't assume that a chemical is safe. Contact the Industrial Hygiene Program.

- •Percentage of the mixture (optional). The percentages do not usually add up to 100% since not only the hazardous ingredients have to be listed. This is NOT a trade secret recipe.

PHYSICAL/CHEMICAL CHARACTERISTICS

- •<u>Vapor Pressure</u>--a measure of a liquid's tendency to evaporate
- •<u>Vapor Density</u>--is a vapor or gas that is lighter and heavier than air
- •<u>Appearance and Odor</u>--depending upon your senses to detect or identify hazardous material to evaluate the risks, which very greatly depending on how a material is used.

FIRE AND EXPLOSION HAZARD DATA

- •<u>Flashpoint</u>--the lowest temperature at which a liquid gives off enough vapors, which when mixed with air, can be easily ignited by a spark. The lower the flash point, the greater risk of fire or explosion. Remember it's the vapors that burn, not the liquid.

REACTIVITY DATA

Reactivity, in this context, is the tendency for a material to chemically change or breakdown and to become more dangerous. Precautions include:

•Conditions to Avoid--such as light or heat
•Materials to Avoid--for example: sodium and water will react vigorously to generate hydrogen, creating a fire hazard.

HEALTH HAZARD DATA

If you need health hazard information that is not an MSDS, contact the Industrial Hygiene Program (3-2596) or the Environmental Health and Safety Occupational Health Screening program (3-5360).

•Routes of Entry--How a hazardous material can enter your body:
Inhalation, Skin Absorption, and Ingestion

•Short-term Health Effects (*Acute)*--symptoms may be felt immediately after the first brief contact like: burns, watery eyes, sore throat

•Long-term Health Effects (*Chronic*)--symptoms may be felt after repeated contact with the same hazardous material over a long period of time

-References that list a chemical as a carcinogen or potential carcinogen
-Signs and Symptoms of Exposure
-Medical Conditions Generally Aggravated by Exposure
-Emergency and First-aid Procedures

**If you are concerned about a chemical exposure you may have had, report to the MIT Medical Department and bring the MSDS with you, if possible.

PRECAUTIONS FOR SAFE HANDLING AND USE

•Spill and Leak Procedures--The Environmental Medical Service (3-5360) can advice you on specific procedures and provide protective equipment. According to MIT policy, the person who creates a spill is responsible for the clean-up.

To dispose of hazardous waste, call x2-3477

CONTROL MEASURES

The Industrial Hygiene Program (x3-2596) can answer specific questions regarding ventilation and personal protective equipment for normal working conditions and emergencies. Suitable control measures are based on how a material is used.

POLICY ON THE IDENTIFICATION AND DISPOSITION OF CHEMICAL, BIOLOGICAL, AND RADIOACTIVE SUBSTANCES
(In Laboratories or Other Work Areas)

Purpose

To assure that persons working with chemical, biological, or radioactive substances properly identify, through labeling, all containers of such substances.

Requirement

THAT THE CONTENTS OF ALL CONTAINERS OR APPARATUS CONTAINING SUCH SUBSTANCES BE IDENTIFIED BY CHEMICAL NAME. (SYMBOLS AND/OR ABBREVIATIONS ALONE ARE NOT ADEQUATE). THE OSHA HAZARD COMMUNICATIONS STANDARD SPECIFIES THAT:

- LABELING INCLUDE INFORMATION ON APPROPRIATE HAZARD WARNINGS
- LABELS ON INCOMING CONTAINERS OF SUCH SUBSTANCES SHALL NOT BE REMOVED OR DEFACED

Enforcements

Supervisors, advisors, or other persons responsible for organizing and directing work will be required to enforce compliance with the provisions of this policy by all persons whom they supervise. The supervisor of any person who is to vacate a laboratory or other work area shall, prior to such vacating, arrange for the proper disposition of all chemical, biological, and radioactive substances. The supervisor shall require that all substances be identified, containerized and labeled before releasing or reassigning the laboratory or work area to the next occupant.

Disposal

Unwanted substances not requiring inactivation in the laboratory shall be disposed of through existing Institute disposal procedures outlined in the MIT Accident Prevention Guide published by the Safety Office.

DEPARTMENTS ARE FINANCIALLY RESPONSIBLE FOR THE SPECIAL HANDLING OF ANY UNIDENTIFIED SUBSTANCES (E.G., ANALYSIS; PACKAGING) BEFORE THE WASTE CAN BE DISPOSED OF THROUGH THE SAFETY OFFICE.

Packaging, labeling, and disposal of radioactive materials are handled by procedures established by the Radiation Protection Office.

Procedure for disposing of biological materials are outlined in the MIT Biosafety manual published by the Biosafety office.

Publicity and Monitoring

Departmental Safety Committees will annually post, publish, circulate or otherwise announce the requirements of the policy to all affected personnel within the department.

Departmental Safety Coordinators in their normal day-to-day activities will check for compliance with this policy and report to their supervisors violations in the area of responsibility.

(This policy has been approved by the MIT Council on Environmental Health and Safety).

POLICY FOR TERMINATION OF LABORATORY USE OF HAZARDOUS MATERIALS

The Principal Investigator (PI) assigned to a laboratory is responsible for the proper disposition of all hazardous materials used in the laboratory. Ultimate responsibility for hazardous materials management lies with the PI. Proper disposition of hazardous materials is required when ever an investigator leaves the Institute or transfers to a different laboratory. The PI should contact EHS or EMP.

Routine Laboratory waste chemical removal service is provided by the EMP at no charge, provided that they are properly identified and that the chemicals are removed on a small quantity basis as generated. In cases where a major clean-out must occur, for example, a move or accident clean-up, a waste removal vendor will come to the lab and the department will be charged for this cost.

Any regulatory action or fines resulting from improper management of chemicals or disposal of hazardous materials will be the responsibility of the Department. The EMP will not be responsible for loss incurred by individuals or departments as a result of regulation-mandated removal of hazardous materials.

An exit inspection tour of departing Investigator's laboratory(ies), equipment room (s), and refrigerators/ freezers will be conducted by the Department Head or his/her designate with the departing Investigator when possible. (This tour will be conducted for departing graduate students, post doctoral fellows, and other staff members.)

CLOSEOUT PROCEDURES FOR HAZARDOUS CHEMICALS IN LABORATORIES

The following procedures are to be followed/completed when an investigator leaves the Institute or transfers to a different laboratory.

POLICY

> The proper disposal of waste chemicals at MIT is a serious concern, and every effort should be made to do it safely and efficiently. The responsibility for the identification and handling of waste chemicals within MIT necessarily rests with the individuals who have created the waste.

PREPERATION FOR WASTE PICKUP

> Label waste properly. It is up to each department, group or experimenter to identify waste materials properly before disposal; inadvertent mixing of incompatible materials could have serious consequences.

Protection of the environment makes the disposal of large quantities of chemical and solid waste a difficult problem. It is in everyone's best interest to keep quantities of waste to a minimum.

1. Before disposing of unwanted, unopened, uncontaminated chemicals check with others in your department who may be able to use them.

2. Make sure all sample and products to be disposed of are properly identified, labeled with its chemical name, and containerized. Do not leave them for others to clean up after you. For more information on identifying waste see the subsequent sections on Identification, Unknown Waste and Paperwork.

Procedures:

The following summary provides a general overview of regulatory requirements applicable to hazardous waste generators.

I. Waste Identification:

Hazardous waste (HW) includes materials that possess hazardous characteristics (e.g. toxic, ignitable, corrosive or reactives), or substances that are listed as hazardous waste by the regulatory agencies.

II. Containers and Labeling:

Separate containers should be used for different categories of chemical wastes and the container should be compatible with the waste contained. In addition, only compatible chemicals should be combined. Any chemicals spilled on the outside of the container must be immediately cleaned off. Containers, which store hazardous waste, must be properly and clearly labeled. Labels must included: 1) the words "Hazardous Waste"; 2) the chemical names of constitutes (e.g. "ethanol"); 3) the hazards associated with the waste in words (e.g. "Toxic"). The labels must be dated as soon as a satellite accumulation container becomes filled. The HW labels are available from EMP (2-3477 or http://web.mit.edu/environment/hazmatform.html).

III. Accumulation & Storage:

The Institute allows two types of hazardous waste areas: less than 90-dat storage areas and areas that are often referred to as satellite accumulation areas (SAA).

Satellite Accumulation: SAA must be established near the point of waste generation and remain under the control of the person generating the waste. SAAs are defined by trays or tubs ("secondary containers") labeled as "Hazardous Waste Satellite Accumulation Areas" (these stickers are provided by EMP). A maximum of 55 gallons of hazardous waste or 1 quart of acutely hazardous waste are permitted at each satellite accumulation area. Only one container is allowed per waste stream. Satellite accumulation containers must be TIGHTLY closed unless waste is being added to the container. Containers of incompatible wastes cannot be stored within the same secondary container in an SAA.

Waste containers can remain indefinitely in an SAA until they are full. Once a HW container is filled, the label must be dated and the container removed from the satellite accumulation area within three

days. EMP provides a pickup service for the waste ready for disposal. HW pickup can be requested online at:
http://web.mit.edu/environment/hazmatform.html or by calling EMP at 2-3477.

Storage: The storage areas must meet the same requirements as the satellite accumulation areas except for the amount and type of HW stored. However, the maximum storage time cannot exceed 90 days. EMP manages the less than 90-day storage areas. HW pickup from a less than 90-day storage area can be requested in the same way as for a SAA.

IV. Inspections

Hazardous waste areas, SAAs & less than 90-day areas, must be inspected on a weekly basis. SAAs are inspected weekly by the EHS Rep or their designee using the Level 1 Checklist. Less than 90-day areas are inspected by members of the EHS office's Environmental Management Program weekly.

TYPES AND PROCEDURES

SOLVENTS

Organic solvents must not be put down the drain. Regulations which apply to MIT's sewer system prohibit the discharge of organic solvents into the sewer system. This applies to all organic solvents whether flammable or nonflammable, miscible or non miscible with water. Organic solvents should be placed in suitable containers where there is no danger that vapors or the liquid will escape. Containers shall be capped tightly, labeled prominently, and sent to the waste chemical storage area. Mixtures of organic solvents that are compatible and confined in one container must be identified with an estimated proportion in fractions or percentages of each solvent in the mixture.

Ether that is in cans must be transferred to glass bottles or plastic coated bottles and diluted with water before being sent to the storage area.

ACIDS/BASES

Acids and alkaline solutions may be placed in proper containers tightly capped, labeled and sent to the waste chemical storage area.

Many laboratory operations create neutralized acids and alkaline solutions which may be put down the drain providing that they do not contain heavy metals or toxic contaminants. Concentrated acid and caustics may be sent to the waste storage area in proper containers tightly capped and labeled.

SALTS

Inorganic and organic solids in their original containers that are designated as waste because they are contaminated, old or of questionable purity, may be sent to the storage area.

MERCURY

Mercury must be removed from lab apparatus and put into jars or bottles before sending to the storage area. Broken mercury thermometers must be put into a jar or secondary container. Clean

up materials from a mercury spill may be containerized, labeled and set to the storage area. Any laboratory or department that is interested in sending mercury to be distilled, and to receive a credit for the same, must take the responsibility of getting the mercury to the proper disposal vendor.

TOXICS

Cyanide compounds, arsenic lead, and heavy metal wastes should be placed in bottles and containers, sealed tightly, labeled, and sent to the chemical waste storage area.

Consult with IHP at 3-2596 if there is any question concerning the toxicity of the waste and the EMP at 2-3477 if there is any question concerning packaging of the toxic waste.

FLAMMABLE METALS

Alkali metals such as sodium and potassium should be placed in suitable container, covered with Nujol (mineral oil), labeled properly, sealed so that there is not possibility of their coming in contact with water and sent to the waste chemical storage area.

Pyrophoric metals such as magnesium, strontium, thorium, and zirconium, and other pyrophoric chips and fine powders should be placed in a metal container, sealed tightly, labeled, and sent to the waste chemical storage area.

OILS

Waste Oil - small quantities of vacuum pump oil or lubricating oils in 1 gallon containers or less may be sent to the waste chemical storage area.

LARGE QUANTITIES

Large quantities of waste chemicals to be removed from a laboratory may be more than the normal amount for the SO to pick up and the department will be financially responsible for the disposal. Some examples are the wastes collected in drum lots form a research project, clean-out of a laboratory of old reagents, and chemicals which would be packed into drums, and the waste chemicals to be pumped out of a collection or storage tank.

OTHER TYPES - SPECIAL PROCEDURES REQUIRED

Radioactive material disposal is handled in accordance with procedures established by the Radiation Protection Office (RPO).

Biological Waste and Physically Dangerous Waste (Sharps) must not be sent to the chemical storage area. These wastes are deactivated and disposed of according to procedures set forth by the Biosafety Office (BSO) at 3-1740.

Capacitors, transformers, equipment, and oil that contain PCB's are the responsibility of the department involved. Information on possible disposal contractors can be obtained by calling the SO. Testing for PCB's is done by IHO at 3-2596.

Waste Oil - Bulk quantities of waste oil stored are the responsibility of the department involved. See "Guidelines for Handling Waste Oil in Bulk Quantities", at the end of this section.

CONTROLLED DRUGS

1. Controlled substance permits are issued by the U.S. Drug Enforcement Agency (DEA) and are issued to individual researchers. MIT has no central record of permit holders.

2. Abandonment of a controlled substance is a violation of the DEA permit conditions. Disposition of controlled substances is the responsibility of the licensee.

3. Permission to transfer ownership of a controlled substance must be obtained from the DEA.

FOR GAS CYLINDERS (All sizes)

Gas cylinders are to be returned to the proper vendor. Some small lecture bottles are the non-returnable type which become a disposal problem when empty or near empty with a residual amount of gas. Call the Office of Laboratory Supplies (OLS) for information on the disposal of non-returnable cylinders. Some cylinders can be picked up and returned to local vendors. For other non-returnable cylinders, it is the responsibility of the researcher or their department to ship them back to the supplier. When ordering gases in lecture bottle size be sure to order gases in a returnable cylinder.

FOR ANIMAL AND HUMAN TISSUE

1. If tissue is held in a liquid preservative, tissue and liquid should be separated. Please note: vapors may be hazardous to personnel. Identify preservative and call IHP for advice on personal protection.

2. Liquid preservatives are usually disposed of as a hazardous waste. Contact the SP at 3-3436 for assistance. Do not assume that the preservative can be introduced into the sanitary sewer.

3. To dispose of tissue in a recognizable form, contact the Division of Comparative Medicine (DCM) at 3-1756 to arrange incineration of the material.

4. If appropriate disposal is uncertain, contact the Biosafety Program *BSP) at 3-1740.

5. Defrost, clean, and decontaminate refrigerators, freezers and any other equipment.

6. If equipment is being consigned to the used property office, a new PI or movers, attach an "MIT Equipment Decontamination Record" tag, available from your AO or the BSP.

7. If samples must be saved, locate appropriate person to take the responsibility for them and notify Department Head. Store in an appropriate location.

FOR MICROORGANISMS AND CULTURES

1. Steam and sterilize or chemically deactivate waste and dispose of as regular trash or sharp waste as appropriate. Follow the MIT decontamination and waste procedures. Complete and attach appropriate tags prior to disposal. Call the BSP if there are any questions.

2. Clean and chemically decontaminate incubators, drying or curing ovens, refrigerators, freezers and other equipment. If respirators or gloves are needed, call IHO for assistance.

3. If equipment is being consigned to the used property office, a new PI, or movers, attach an "MIT Equipment Decontamination Record" tag.

4. An inventory transfer list must be produced by the departing faculty member of all biologicals, (such as cell cultures, parasites, bacteria, viruses, vectors, prions and other microorganisms), that will be transferred to another person's laboratory. The list must specify for each agent, the faculty member who will be the recipient of the transfer and the recipient's address. The inventory transfer list and a copy of the inventory list must be presented to the departmental inspector prior to the exit inspection tour. The departing investigator will be held responsible for rectifying any problems found during the inspection.

FOR RADIOACTIVE MATERIALS

1. Package all radioactive materials, (stock vials, sealed sources, lead containers/shields, and wastes), and label them in accordance with the Radiation Protection Office (RPO) procedures for pickup as a radioactive waste, or for transfer to another permitted use area.

2. Prior to the transform notify RPP at 3-2180 to obtain authorization for the transfer and to assure that the new use area is properly posted and permitted by RPP.

3. Arrange for pick-up of radioactive waste through RPP.

4. Following removal of all radioactive wastes and stock materials, perform a contamination survey, (and if appropriate a GM instrument survey), of all former storage and use areas within the laboratory or under the permit to be closed out. **NOTE:** Areas of potential residual contamination include refrigerators /freezers, centrifuges, water baths, hoods, sinks, traps, floor areas under waste containers, other plumbing fixtures, etc. Also, if there are contaminated areas

or equipment in the laboratory, they must be decontaminated. A follow-up survey must be made of the decontaminated areas and the results included in the above survey.

5. Provide the Department Head and RPP with a copy of the final contamination survey.

6. Schedule the close-out survey by RPP. Do not allow further use of the laboratory until the RPP close-out survey is complete and the door posting is removed by RPP.

7. Radiation permit holders must verify their inventory records with those from RPP.

8. If the permit holder fails to complete the above steps, the Department will be responsible for the completion of, (or payment of costs to complete), the required close-out steps. The Department is responsible for immediate notification of RPP if the above steps have not been completed.

FOR MIXED HAZARDS

Occasionally it is necessary to dispose of materials that contain more than one of these hazards. Contact the appropriate branch of EHS at the number listed at the end of this document for chemical, radioactive, or biological agent assistance.

FOR EQUIPMENT

1. Laboratory equipment to be left for the next occupant, going to storage, or being released to movers, must be decontaminated before the investigator leaves the laboratory, and a decontamination sticker affixed to it. If hood, biosafety cabinets or other containment equipment have been used with hazardous substances or organisms, EHS or Physical Plant must be advised.

2. If laboratory equipment is to be discarded, be aware that capacitors, and PCB containing transformers, mercury switches, mercury thermometers, radioactive sources and chemicals must be removed before disposal. Contact the appropriate EHS office or the SP for assistance

3. Equipment potentially contaminated with radioisotopes must be surveyed by RPP prior to disposal, reuse or storage.

4. Wash off fume hood surfaces and counter tops using a detergent solution, unless instructed otherwise by IHP. Contact IHP if you have any questions.

FOR SHARED STORAGE AREAS

A frequent problem encountered is that of common storage units, (refrigerators, freezers, cold rooms, stock rooms, waste collection areas, etc.), where no individual PI has been assigned responsibility for management of the unit. Prior to departure, all researchers must carefully survey shared facilities in order to locate and appropriately dispose of their materials. The department is responsible for shared spaces.

FINAL CHECKOUT PROCEDURE

1. Notify Department Head when laboratory has been cleaned.

2. The departing faculty member must complete the Departmental Hazardous Chemical Inventory form. The form must be presented to the Department Head or his/her designate prior to the exit inspection tour. The departing faculty will be responsible for rectifying any problems found during the inspection.

REGULATORY IMPACT

Mishandling of hazardous materials can result in accidents, citations, fines, and/or loss of right to use hazardous materials. Adverse publicity is also a frequent result.

The MIT EHS Office is available to assist all investigators to meet their responsibilities in the management of hazardous materials, whether they are leaving or relocating.

Environmental Health and Safety Office	2-3477
Biosafety Program	3-1740
Industrial Hygiene Program	3-2596
Radiation Protection Program	3-2180
Safety Program	2-3477
Environmental Management Program	2-3477

MIT ENVIRONMENTAL HEALTH AND SAFETY OFFICES
N52-496, ext. 2-3477

WASTE CHEMICALS

Waste Reduction

1. Order only the amount of material you need for your project even if you get twice as much for the same price.

2. Use only the amount of material that is needed for conclusive results.

3. Avoiding storing excess material just because you may want it in the future.

4. Before disposing of unwanted and unopened chemicals, check, with others in your department who may be able to use them.

5. On termination of a research project or thesis, make sure all samples and products to be disposed of are identified, labeled with its chemical name and properly containerized.

Transportation and Storage

1. A pickup of waste chemicals may be arranged by calling the Safety Office.

2. The institute has provided a storage area which is maintained by the Safety Office.

Types and Methods

1. **Organic solvents** must not be put down the drain. Solvents should be properly containerized and sent to waste chemical storage area.

2. **Mixtures of compatible organic solvents** in one container must be identified with an estimated proportion of each solvent.

3. **Waste Ether** in cans must be transferred to glass bottles or plastic-coated bottles and diluted with water before being sent to the waste storage area.

4. Many laboratory operations create neutralized **acid and alkaline solutions**, which may be put down the drain providing that they do not contain heavy metals or toxic containments. Concentrated acids and caustics may be sent to the waste storage area in proper containers, tightly capped and labeled.

5. **Inorganic and organic solids** in their original containers that are old, contaminated or of questionable purity may be sent to the storage area.

6. **Mercury waste**, broken thermometers and clean-up materials from a mercury spill may be sent to the storage area.

7. **Cyanide compounds, arsenic, lead, and heavy metal wastes** should be containerized, sealed tightly, labeled, and sent to the storage area.

8. **Alkali metals** should be placed in a suitable container, covered with Nujol (mineral oil), sealed, labeled, and sent to the storage area.

9. **Pyrophoric metals** such as magnesium and strontium should be placed in a metal container, sealed, labeled, and sent to the storage area.

10. **Waste oil** (vacuum pump oil) may put in suitable containers, labeled and sent to the storage area. Drum quantities are a department responsibility.

11. **Transformer oil** which may contain PCB's and capacitors which contain PCB's are the responsibility of the department involved.

12. **All gas cylinders** are to be returned to Laboratory Supplies which has the responsibility to return the cylinders to the proper vendor.

13. **Controlled drugs, radioactive waste, and biological waste** that may contain live viruses must not be sent to the storage area. Different methods for these wastes.

14. **Large quantities of waste chemicals** which are more than a normal pick-up will be the financial responsibility of the department involved.

Identification and Unknown Waste

1. All waste chemicals must be identified by the chemical name. Do not use symbols or abbreviations. The proportions of a mixture in one container must be identified. Trade name materials must be identified by a chemical name.

2. Containers must be labeled and have a "Red Tag" attached.

3. Unknown waste chemicals cannot be accepted for disposal. Disposal contractor cannot accept or ship unknown waste. It is the responsibility of the department involved to identify all waste chemicals.

Packaging and Paperwork

1. Waste chemicals must be packaged and containerized in a manner that will allow them to be transported without danger of spillage, vapors, or explosion. Wastes not properly packaged will not be accepted.

2. A packing list must be filled out by personnel in the laboratory or department which wants the waste picked up by the Safety Office. Information concerning the quantity, chemical name, solid or liquid, and hazard associated with the waste, i.e., flammable, toxic, water-reactive, etc., must be filled in and signed by an individual in the department involved.

Sewer Discharge Prohibitions

Listed below are some materials the Massachusetts Water Resourse Authority prohibits from entering the sewer system:

- Sand, mud, metal, glass, wood, plastics, improperly shredded garbage, rubber, latex, lime or other slurries
- Grease, animal guts or tissues, bones, hair, hides or fleshings, entrails, feathers
- Fuel oil, grude oil, lubrication oil, glass grinding or polishing wastes
- Gasoline, kerosene, maphtha, benzene, toluene, zylene, ethers, alcohols, ketones, aldehydes, peroxides, and methyl ethyl ketone
- Any liquid or vapor with a temperature higher than 180° Fahrenheit (82° Centigrade)
- Mercury, PCBs, Pesticides, Phenanthrene
- Any hazardous waste
- Water or wastewater with pH lower than 5.5 or higher than 10.5.

STORAGE COLOR CODES OF VARIOUS MANUFACTURERS

Hazard Class	Malling Krodt	Fisher	J.T. Baker	E.M. Science	Storage Area's Characteristics
CORROSIVE burns or irritates skin, eyes, nose, throat, & lungs	white	white	white	white	resist corrosion store away from red, yellow & blue coded chemicals: ventilated
FLAMMABLE fire hazard	red	red	red	red	approved for flammable liquids
HEALTH HAZARD harmful/toxic/poisonous if: breathed in, swallowed or absorbed by skin	blue	blue	blue	blue	secured area
INCOMPATIBLE may react violently if contacts or mixes with certain chems.	blue band	"STOP" warning logo	striped color label	none	determine on case by case basis; away from same color code
MINIMUM TO MODERATE HAZARD still handle with care	green	gray	orange	orange	general
REACTIVE may react violently with water or air (Oxidizer)	yellow	yellow	yellow	yellow	store away from combustibles and flammables
WHERE COLOR CODE IS ON LABEL:	bottom half	band at bottom	top half	band at top	
References:	NFPA 704 DOT 172	Blue=Health Hazard Yellow=Reactive		Red=Fire Hazard White=Special Hazards	

DEPARTMENT OF BIOLOGY
DEPARTURE FORM AND CHECKLIST

NAME: _____

LAB GROUP: _____

ROOM: _____

FORWARDING ADDRESS: _____

_____

_____

EFFECTIVE DATE OF TERMINATION: _____

_____

	YES	NO
Laboratory space left orderly and clean	( )	( )
All chemicals and materials removed from warm rooms, cold rooms, freezers and storage cabinets, etc.	( )	( )
Office space cleaned; file cabinets, bookcases, etc.	( )	( )
All equipment returned	( )	( )
All waste and samples were removed and properly disposed	( )	( )
All keys, access card, & ID turned into Headquarters	( )	( )

Any remaining chemicals and samples procured by me are under the care of

_____ in _____
Name Room

Please sign: _____

I have confirmed the above checklist and accept all responsibility of compliance.

_____
Principal Investigator

_____
Laboratory Safety Representative

HAZARDOUS CHEMICAL WASTE
SATELLITE ACCUMULATION AREA5

TRAINING: Environmental regulations require those who handle hazardous waste be trained. Training must take place within six months of date of hire or student involvement with hazardous waste, and annually thereafter. **Training is offered by the Department Chemical Hygiene Officer (CHO). Contact MIT Environmental Health and Safety Office (EHS), 2-3477, or IHO, 3-2596, for details.**

CONTAINER LABELING: All hazardous waste containers must be labeled at the time that the waste is first placed into the container. Labels must include the following information:

1) the words **"Hazardous Waste"**;
2) the chemical name of the contents in words, not abbreviated, no formulas. (e.g., **"Waste Sulfuric Acid"**)
3) the associated hazards of the waste (e.g., **"Corrosive, Flammable"**, etc.);
4) Do not place the date on the tag until the container becomes ***full***.

Special labels (red tags) for hazardous waste containers are provided by the MIT Safety Office. **Call the EMO, 2-3477, if you need red tags.**

CONTAINER CLOSURE: Hazardous waste containers must be kept closed at all times during storage except when waste is being added or removed. Use screw cap containers. **Keep containers closed. Regulations do not permit funnels to remain in waste containers after filling.**

STORAGE: For safety and environmental reasons, hazardous waste must be stored in a designated "Satellite Accumulation Area", (e.g., in the hood, cabinet under the hood, or other approved designated area). These areas must be inspected weekly for container leakage, and results documented. **Containers must be *removed* from the *Satellite Accumulation Area* within *three days* after the waste container becomes *filled.*** Closed, properly labeled containers that are ***partially filled*** may remain in a "Satellite Accumulation Area" indefinitely. Closed, full waste containers, when properly labeled and dated, may be stored in a Hazardous Waste Storage Area until the chemical waste is picked up by the Safety Office.

HAZARDOUS CHEMICAL WASTE PICKUP: Contact the MIT EMO, 2-3477 when full, properly labeled waste containers area ready for waste pickup.

For information on Radiation Waste Pickup, contact the Radiation Protection Office, 3-2180.
For information on Sharps Disposal or Biological Waste, contact the Biosafety Office, 3-1740.